The most notable phenomenon visible during the Indian eclipse was the Great Horn visible in Fig. 3, the structure of which was extremely curious. Below it in the drawing we have a part of the chromosphere, including a "flaring," which has been since called a "radiance" by the American astronomers. Fig. 4 was the last photograph taken, and here it is seen that the Great Horn is nearly eclipsed, and that the chromosphere on the opposite side of the sun is now exposed, including a strange animal-like form, which much struck the observers. An examination into the structure of the Great Horn is not the least interesting part of the report.

Major Tennant thus sums up his results :—

First.—The corona is the atmosphere of the sun not self-luminous, but shining by reflected light. It is evidenced both by the spectroscope and polariscope that this is the case, but there is one reservation to be made. The polariscope has shown clearly that the light of the brightest part of the corona is mainly reflected; but, looking to the flare which is seen in photographs No. 2 and 3, it seems impossible to doubt that in those places there must have been some inherent luminosity in the corona; unless indeed we consider the flare as a modified form of protuberance. It is, I think, now certain that luminous gas issues from what is more strictly the sun, and I apprehend this flare to be some of this.

Secondly.—The Great Horn certainly was composed of incandescent vapours, and probably all the brilliant protuberances are the same. In the Great Horn these vapours were hydrogen, sodium, and magnesium. It seems to me perfectly certain that the ignited hydrogen issued from the sun itself, and that it carried up with it the light vapours of sodium and magnesium far above the level at which they would naturally lie; hydrogen naturally would be the very highest of the gaseous vapours, and consequently the coolest; if, however, it were set free at the surface of the sun it would be intensely hot, and seek, with great violence, to ascend, in which process, if there be a stratum of heated vapours, such as is usually believed to exist round the sun, the hydrogen would partly displace and carry up these vapours, and the lighter would be taken in preference. In fact, in this case it has carried the two lightest, and that of iron, which is so much heavier (I think we may presume this from the absence of the line corresponding to E), was either displaced or dropped sooner than the height at which I observed. Photograph No. 1 shows that there were two jets of vapour concerned in forming this Horn. One, the largest and most northerly, is seen nearly perpendicularly to the limb, and seems also to have been the most luminous; the other issues about 20,000[*] miles towards the south, and at an angle. They met at a height of some 16,000[*] miles, and the result was the rapid vorticose motion, which is evidenced in all the photographs as having existed in the upper portion. I believe I have the good fortune to be the first person to recognise such a phenomenon.

. . . .

I think that gases or vapours issuing quietly from the solar surface would tend locally to raise the superincumbent ignited vapours. In places where they were most abundantly given out the elevation would be greatest, everywhere the gas would leak through in streams, producing occasionally such phenomena as the flare I have spoken of in Nos. 2 and 3. For a time the ignited vapour might, I think, form, as it were, a case for the light included gas, which would be to all appearance inflated like the animal figure in No. 6. Soon, however, the slightly coherent casing would be burst and the gaseous contents would issue freely; the heavier vapours would, of course, to some extent be carried off by the gas, but would mainly settle down in small masses. Such, I think, is the state depicted in the southern protuberance of No. 1.

I would now draw attention to Plate No. 1, and the glare and luminous stratum. If that glare be from sunlight, it must, I think, be acknowledged that the remaining ray was but small. The luminous nearly even stratum then is not the sun; but it is intensely bright, so much so, that nowhere is it lost in the solar glare. Its height is but small (I estimate it at 7,200 miles), and I believe it to be the mass of heavy luminous vapours, to whose elective absorption we owe the Fraunhofer lines in the solar spectrum. At the north end of this stratum near the Great Horn, it is broken into beads of light;[†] and I am disposed to think these are the veritable Baily's beads, of which I have always felt that the description would be difficult to apply to sunlight; I mean the statement which has been made of the light being silvery, &c. If these beads are really phenomena of the absorbing stratum, one can well understand the use of such terms.

In an addendum, in which the author's theory is attempted to be maintained, Major Tennant refers to the work which has been done in this country between the eclipse and the issue of the report. He considers that the sun is surrounded by an atmosphere sufficiently dense to reflect the solar light, but it is not explained why a continuous spectrum and not the solar spectrum is actually reflected; and that the hydrogen is enveloped in a denser atmosphere, resisting its diffusion and expansion, but why the spectrum of this atmosphere is so simple is not explained.

The author concludes by acknowledging the services rendered by Mr. De la Rue in the preparation of the report.

FALL OF A METEORITE

THE Director of the Meteorological Office has forwarded the following extract from a letter from M. Coumbary, Director of the Imperial Meteorological Observatory at Constantinople for publication :—

Constantinople, 9 mars, 1870

Mon cher Monsieur,—Je saisis l'occasion qui m'est offerte pour vous transmettre la communication que vient de nous faire M. Carabella, Directeur des Affaires Etrangères du Vilayet de Tripoli de Barbaru.

"Tripoli, 2 février, 1870

"Le Mutasserif de Mourzouk (Fezzan), latitude 26° N., longitude 12° E. de Paris, nous fait savoir que vers le 25 décembre, 1869, il est tombé à l'est de la ville, vers le soir, un immense globe de feu, mésurant un mètre à peu près de diamètre, et qu'au moment où il a touché terre il s'en est détaché de fortes étincelles qui, en se produisant, claquaient comme des coups de pistolet, et exhalaient une odeur que l'on n'a pas specifiée. Cet aërolithe est tombé à peu de distance d'un groupe de plusieurs arabes, parmi lesquels se trouvait le Chiok-el-Veled de Mourzouk. Ceux-ci en ont été tellement éffrayés qu'ils ont immédiatement déchargé leurs fusils sur ce monstre incompréhensible. Son Excellence Ali Riza Pacha a écrit à Mourzouk pour faire transporter ici l'aërolithe; au cas probable où il soit trop pesant on le mettra en pièces; nous vous enverrons tout cela. Il y a un mois de voyage d'ici à Mourzouk. Ce n'est donc que dans deux mois à peu près que nous pourrons vous faire cette expédition. S'il peut vous être de quelque intérêt de le savoir, je vous dirai que quelques voyageurs du Waddad que j'interrogeais m'ont dit que le Sultan du Waddad et tous les grands personnages de sa cour ont des poignards, des sabres et des lances faits avec du fer tombé du ciel, et qu'il en tombe de grandes quantités dans ce pays-là. (Sd.) "L. CARABELLA"

Je crois devoir vous informer qu'au reçu de cette lettre et à la suite des démarches nécessaires, S.A. le Grand Vizir a bien voulu faire donner ordre immédiatement par télégraphe à Tripoli, pour que l'on prenne les mesures nécessaires afin que ce météorite nous parvienne intact.—Recevez, cher monsieur, &c.,

(Sd.) ARISTIDE COUMBARY

NOTES

ON the 5th of March died at Vienna, Joseph Redtenbacher, Professor of Chemistry at the University. He was born in 1810, and studied under Eichig, conjointly with whom he published a determination of the atomic weight of carbon, and several other memoirs. His principal merit consists in the discovery of acrolein and acrylic acid. Most of his papers were published between 1839 and 1848. With his death chemistry in Austria passes entirely into younger hands; his colleague, Professor Schröber, the discoverer of amorphous phosphorus, having lately been nominated Master of the Mint, and replaced in his chair by Illasiwetz. The succession of Redtenbacher will be divided into two parts, and the building of a new laboratory on the largest scale will open a vast field to the activity of his successors.

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[*] These dimensions refer to the projections on a plane perpendicular to the visual ray.

[†] This is the same place where Captain Branfill saw beads.

The African traveller, Dr. Nachtigal, writing from Mursuk to the *Cologne Gazette*, on the 29th January last, gives some further particulars relative to the murder of Miss Tinné. He says that Sultan Omur, of Bornu, has sent a *meheri* (courier) to Mursuk, in order to make inquiries respecting the murder. The deceased lady's effects and servants have at length been despatched to Tripoli, though the former have not yet arrived. Yehenouchen, the Tuareg chief, has written to Europe, disclaiming all responsibility for the murder, as he had not promised his protection to Miss Tinné, or urged her to undertake the journey to Rhat. He is ninety years old, says Dr. Nachtigal, and has a great reputation for uprightness in his own country, but on the other hand, it is a fact, that his own nephew, Hadji el Schich, who attacked the unfortunate lady and her caravan, and murdered her after receiving her presents and other marks of friendship, is still living with Yehenouchen, and that the latter had directed the Marabout Hadji Ahmed Bu-Slah, who witnessed the murder without attempting to prevent it, either by word or deed, to provide Miss Tinné with an escort to Rhat.

The chair of chemistry at Königsberg has been accepted by Dr. Gräbe of Leipzig, known through his papers on chinone and alizarin.

We regret to announce that Professor Magnus of Berlin has been suffering for several months from a painful disease, which will, most likely, oblige him to interrupt his lectures for some time to come.

We learn from the *Journal of the Society of Arts* that by the death of Mr. William Gibbs, which took place on the 28th ult., the South Kensington Museum acquires the collection of Roman and Anglo-Saxon antiquities collected by him.

Miss Garrett has been admitted as a member of the medical staff of the East London Hospital for children, and was appointed one of the physicians on Wednesday last. This is the first hospital in Great Britain which has recognised in this manner the female medical movement.

In the *Monthly Microscopical Journal* for March is an obituary notice by Mr. Joseph Lister, F.R.S., Professor of Clinical Surgery in the University of Edinburgh, of his father, the late Mr. J. J. Lister, F.R.S., to whom science is so much indebted for improvements in the microscope.

There is a project for the establishment of a Scientific College at Perth, intended to combine, on a small scale, the advantages of the *Ecole des hautes Etudes* and *Ecole Normale Supérieure* of Paris.

The thirty-seventh session of the *Congrès Scientifique de France* will be held at Moulins in August next.

The *Society of Arts Journal* reports that an International Exhibition of Agricultural Machines will be held at Arnheim, in June, July, and August.

The *Scientific American* calls attention to an excellent improvement applied to the passenger car of the Beach Pneumatic Transit Company. The car, in size, is about the same as an ordinary street car, and a single zircon light illuminates its interior with brilliancy. Two small cylinders of compressed oxygen and hydrogen are carried on the car, from which pipes extend to a small burner that supports a piece of zircon, not more than a quarter of an inch long and one-eighth of an inch in diameter. Against this little piece of zircon the two gases impinge, and heat it so intensely as to make it glow with a clear and steady light. Those who fancy that underground railway riding in New York is likely to be a dark and dismal affair will receive new impressions on the subject when they enter the premises connected with the Broadway tunnel. One of the great advantages of the zircon light is that it burns like any other light without requiring adjustment. The light carried on the car before mentioned, burns steadily for seven hours without being touched. The zircon pencil lasts for three months, and is, in effect, the wick of the light.

The annual meeting of the Cotteswold Naturalists' Field Club was held at Gloucester on Feb. 23rd. It was stated that the forthcoming volume of the "Transactions" would contain a most valuable and elaborate paper by Mr. Lucy, F.G.S., which attempts to unravel the intricate history of the distribution of the erratic boulders, boulder drift, quaternary gravels, &c., of the Severn valley, over a given area; a contribution of the highest value to science, and one full of facts of the greatest importance, in elucidating the old physical geography and geology of the Severn valley since the close of the Pliocene epoch. The Transactions would also contain an admirable paper from the pen of Dr. Wright, F.R.S.E., on the "Correlation of the Jurassic beds of France and Switzerland with those of Gloucestershire and Wilts." These papers, both splendidly illustrated by maps and woodcuts, many of which were exhibited to the meeting, were highly eulogised by the president, and referred to as fully maintaining the already high scientific reputation of the "Transactions of the Cotteswold Club." The field meetings for the year have been fixed to take place at Cirencester, Ross, Painswick Hill, Moreton-in-Marsh, and a "foreign meet" at Watchett in Somerset, later in the season, if the weather permit.

A somewhat violent shock of earthquake was felt at Trieste on the 28th of February, at 12·20 p.m. The oscillatory movement from east to west lasted from two to three seconds. The following day at 8·56 p.m. the motion was repeated with greater violence. There was a loud rolling noise, and articles of furniture were thrown down in the houses.

Dr. Wilhelm Hamm, an official of the Austrian Ministry of Agriculture, and well known as author of the "Weinbuch" (Leipzig, J. Weber), has constructed a Weinkarte, published by Costenoble, Jena, exhibiting at a glance the topography, climatology, and statistics of wine-growing in Europe and the islands of the Atlantic. The habitats, climates, and quantities produced; the various growths and qualities of each; and the wine measures, &c., are all indicated in this map.

Sir William Thomson, having had his attention directed to the very great differences that exist in the conducting quality of copper wire professing to be of the "highest conductivity," had a large number of specimens carefully tested and the following are some of the results obtained—the quality is indicated by the resistance of a metre length weighing one gramme. The best specimen was one supplied by M. Bréguet, Paris, of which the resistance was ·153 of an ohm per metre weighing one gramme. Specimens from English manufacturers varied as follows:—·165, ·169, ·171, ·178, ·206, ·213, ·221. Seven specimens labelled "highest conductivity," stood as follows:—·156, ·182, ·201, ·205, ·223, and ·258. As it is to the interest of all scientific men that the copper wire used in electrical instruments shall be of the best quality, there should be general co-operation to discourage as much as possible the use of inferior copper. Variations in conductivity like those in the samples of copper mentioned above would produce instruments varying to the extent of 40 per cent.

The publishers of the *Canadian Naturalist* announce that the periodical is in future to appear quarterly instead of six times a year as heretofore, but the quantity of matter, 480 pages, is not to be diminished. Another and an important particular is, that "the basis of the magazine has been so extended as to include a larger field of popular scientific scope than formerly. Especially with regard to the technology of geological, mining, chemical and agricultural science, new materials will be made available while a general summary of scientific facts and discoveries will form an important feature." An editorial committee, comprising some of the foremost scientific men in Canada, has been appointed and the publication remains, as before, under the "auspices" of the Natural History Society of Montreal. The number just received in this country contains, in addition to a batch of articles on different subjects in natural history, one on the partial eclipse of the sun in August last, as observed at Montreal, by Dr. Smallwood.

AN interesting report on the ravages of the Borer in Coffee estates has just been published by George Bidie, M.B., F.R.G.S. The coffee plant, as is well known, is not indigenous to Southern India, but was first introduced into India upwards of two centuries ago, by a Mussulman pilgrim, Bababooden, who on his return from Mecca brought a few berries in his wallet, and taking up his abode in the hills of Mysore, planted them near his tent, and from these the greater portion of the coffee now growing in Southern India has been derived. It is a native of Caffa in Southern Abyssinia. It is now largely cultivated in Mysore, Cuddoor, Coorg, and other parts along the crests and slopes of the Ghauts. It is a remarkably hardy plant, thriving at various elevations, and under the most different conditions of moisture, soil, and temperature. It is, however, liable to the attacks of certain insects, amongst which the Borer is the most formidable. This is shown by Dr. Bidie to be the larva of a beetle belonging to the Cerambycidæ, and termed the *Xylotrechus quadrupes*. The female lays its eggs in the bark of the plants, hot sunshine favouring their hatching. The larva immediately pierces the bark, and derives its nourishment from the more juicy layers, producing, by the damage it causes, exhaustion of the tree and loss of the crop. The whole duration of the life of the animal from the deposition of the ovum to the death of the beetle does not exceed twelve months. The animal appears to be indigenous, and the causes that have led to the great increase in its ravages during the last few years are drought, want of shade, bad culture, destruction of forest trees in which the insect used to live, and departure of some of its enemies.

THE following changes are announced in the arrangements of the staff of St. Bartholomew's Hospital. One assistant-physician is to have charge of the casualty department; three casualty physicians are to act with him; and one casualty surgeon is to superintend the surgical side. The house-surgeons will have charge of casualty patients.

THE Geographical Society of St. Petersburg has decided to send a scientific expedition into Manchouria and Eastern Mongolia, for the purpose of making archæological and ethnographical researches in those countries. The expedition is to start next April, under the direction of the Archimandrite Palladiy, chief of the Russian mission at Pekin. It is said that the Emperor has contributed 5,000 roubles towards the expenses of the expedition.

THE rainfall of the year ending December 31, 1869, as taken in the neighbourhood of Charing Cross, is registered as follows:—

Height of gauge above ground.	Number of inches fallen.
6 feet	23·760
64 ,,	22·110

MR. E. W. HILGARD, in his Geological Reconnaissance of Louisiana, finds reason for the assumption that "the Gulf coast has in late quaternary times suffered a depression to the extent of at least 900 feet—perhaps more—and during the terrace epoch a contrary motion to the extent of about half that amount." Elsewhere he remarks, "the age of the great gypsum formation has been the subject of much discussion. It has always seemed to me that the great extent of the area over which the cretaceous beds and underlying gypsum are known to be co-extensive, went far to prove that they belonged substantially to the same epoch. Whatever weight may attach to this argument it is greatly enhanced when we find the crystalline limestone and underlying gypsum not only reappearing in northern Louisiana, but actually accompanying each other beneath the waters of the Gulf of Mexico. Whether the volcanic agencies which even now so frequently disturb that great basin, have been instrumental in reducing the sulphur, distilling the petroleum and crystallising the rock salt of southern Louisiana, may be more profitably discussed when more extensive excavations shall have given us an opportunity of closer inspection of the facts."

IN reference to the electro-deposition of nickel, M. Bouilhet states that Jacobi published a method of obtaining thick coatings of nickel by using perfectly neutral solutions. *Cosmos* points out that nickel is especially abundant in Spain.

ON THE TEMPERATURE AND ANIMAL LIFE OF THE DEEP SEA*

II.

DURING the first and second cruises of the *Porcupine*, the temperature of the eastern border of the great North Atlantic basin was examined at various depths between from 54 to 2,435 fathoms, and in widely different localities, ranging from lat. 47° to lat. 55°. The bottom-temperature was ascertained at thirty stations, and serial soundings were taken at seven stations; making the total number of observations eighty-four. (Table II., p. 20.) Amongst all these the coincidence of temperatures at corresponding depths is extraordinarily close; the chief differences showing themselves in the temperature of the surface and of the stratum immediately beneath it. A decided superheating is observable in this superficial stratum, not extending to a depth of much more than 70 or 80 fathoms, and more considerable at the southern than at the northern stations. Whether this "superheating" is entirely due to the direct influence of solar heat, or depends in any degree on an extension of the Gulf Stream as far as the southern part of the area examined, is a question which can only be resolved by the determination of its relative amount at different seasons. Between 100 and 500 fathoms, the rate of decrement is very slow, averaging only about 3° in the whole, or three-fourths of a degree for every 100 fathoms; and this body of water has a temperature so much above the isotherm of the northern stations at which the observations were made, as decidedly to indicate that it must have found its way thither from a southern source. Between 500 and 750 fathoms, however, the rate of decrease becomes much more rapid, the reduction being 5·4°, or above 2° per 100 fathoms; while between 750 and 1000 fathoms it amounts to 3·1°, bringing down the temperature at the latter depth to an average of 38·6°. Beneath this there is still a slow progressive reduction with increase of depth, the temperature falling a little more than 2° between 1000 and 2,435 fathoms; so that at the last-named depth, the greatest at which it was ascertained, it was 36·5°.—Thus it is obvious either that the vast body of water occupying the deeper half of the Atlantic basin has been itself derived from a colder region, or that its temperature has been reduced by the diffusion through it of frigid water from a Polar source. The latter supposition best accords with the gradual depression of temperature exhibited between 500 and 1000 fathoms, which corresponds with the "stratum of intermixture" of the cold area.

The temperature soundings recently taken by Commander Chimmo, R.N., and Lieutenant Johnson, R.N., at various points in the North Atlantic basin, when the requisite corrections are applied for the influence of pressure on the bulbs of the unprotected thermometers employed by them, give results which are remarkably accordant with our own; so that it may be stated with confidence that the temperature of the deeper parts of the North Atlantic sea-board is but a very few degrees above the freezing-point.

Now a glance at the North Polar region, as laid down either on a globe, or any projection of which the Pole is the centre, shows that the Polar basin is so much shut in by the northern shores of the European, Asiatic, and American continents,

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* A Lecture delivered at the Royal Institution (continued from p. 490).